

# What is a Drought Early Warning System?



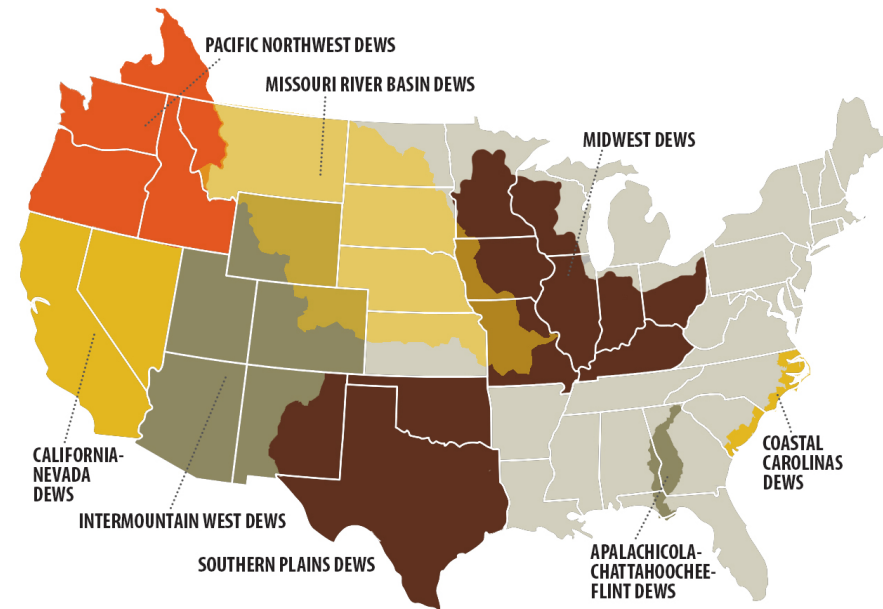
Alicia Marrs, NOAA/NIDIS

October 12, 2016  
Fresno, CA



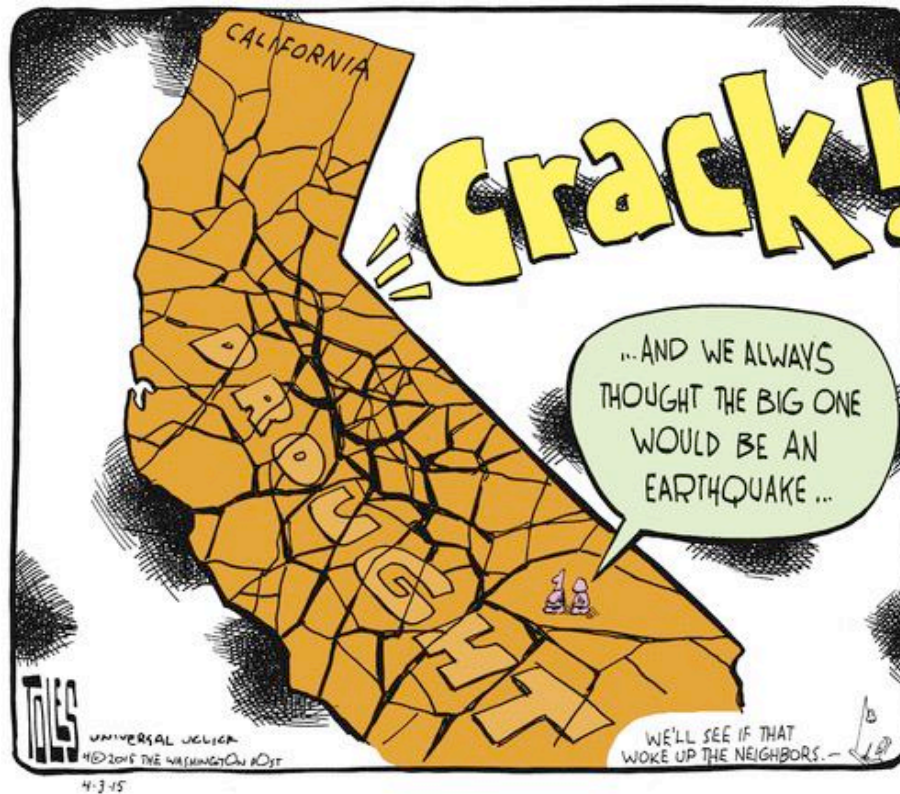
# What is the National Integrated Drought Information System (NIDIS)?

- A NOAA program with an interagency mandate.
- Provide a better understanding of how and why droughts affect society, the economy and the environment.
- Improve accessibility, dissemination and use of early warning information for drought risk management.
- Build off of a network of Regional Drought Early Warning Systems (DEWS) to create a National Drought Early Warning System.



# What *really* is Drought Early Warning?

*Provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response<sup>1</sup>*

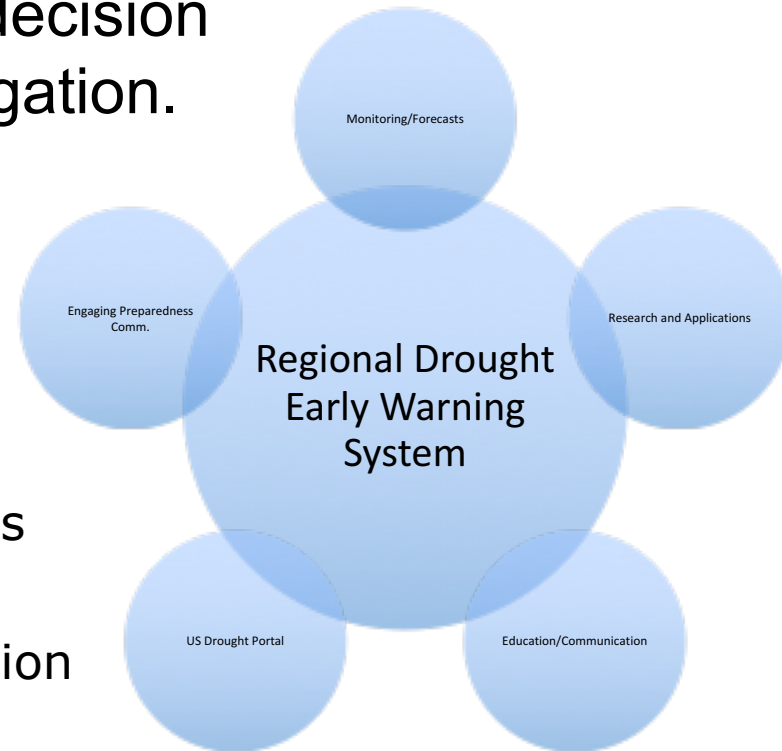


<sup>1</sup>International Strategy for Disaster Reduction

# Regional Drought Early Warning Systems (DEWS)

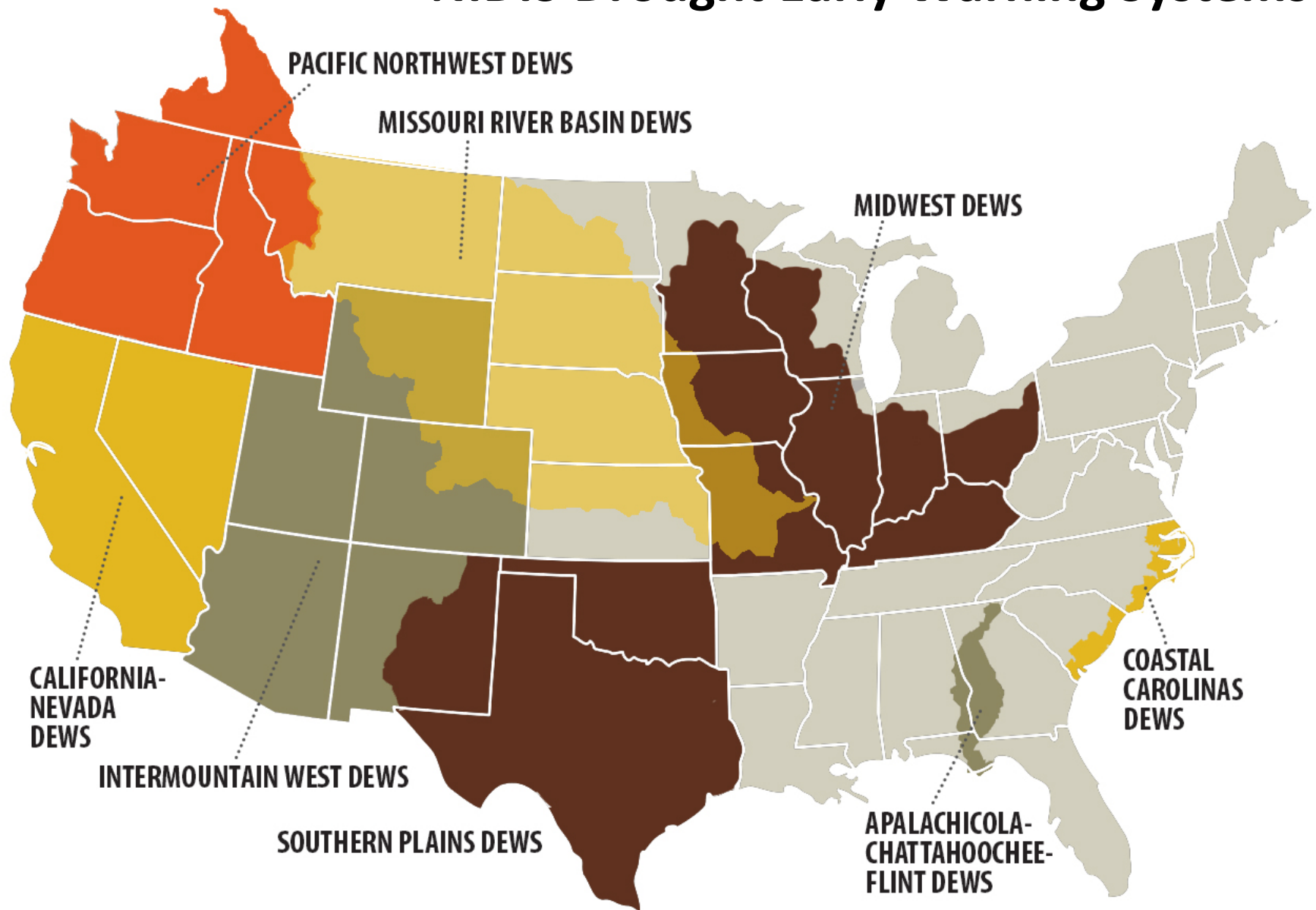
Working with communities and existing networks to build capacity for better decision making for drought planning and mitigation.

- Drought & risk assessments
- Climate outlook forums
- Education and outreach webinars
- Engaging the preparedness community
- Builds capacity to utilize existing products
  - Provide test beds for new products
- Develop new/utilize existing communication networks





# NIDIS Drought Early Warning Systems



# Examples of other DEWS Activities

## Upper Colorado River Basin/Intermountain West DEWS

- **Monitoring & Prediction**

- Upper Colorado River Basin Drought Assessments
- Colorado Water Availability Task Force
- Western Water Assessment Intermountain West Dashboard



- **Innovative Research, Applications & Assessments**

- Evaporative Demand Drought Index (EDDI)
- Water Resources Monitor & Outlook (WRMO)
- Testing the utility of highly-resolved spatial snow data



- **Engaging Preparedness & Adaptation Communities**

- WWA Snowpack Monitoring Workshops (2015)
- Colorado Drought Tournament (2012)



**COLORADO**

Colorado Water  
Conservation Board

Department of Natural Resources



# The original California DEWS

## **Klamath River Basin:**

Provide integrated hydroclimate information for a complex water environment through access to a variety of historical, current, and forecast data

## **Russian River:**

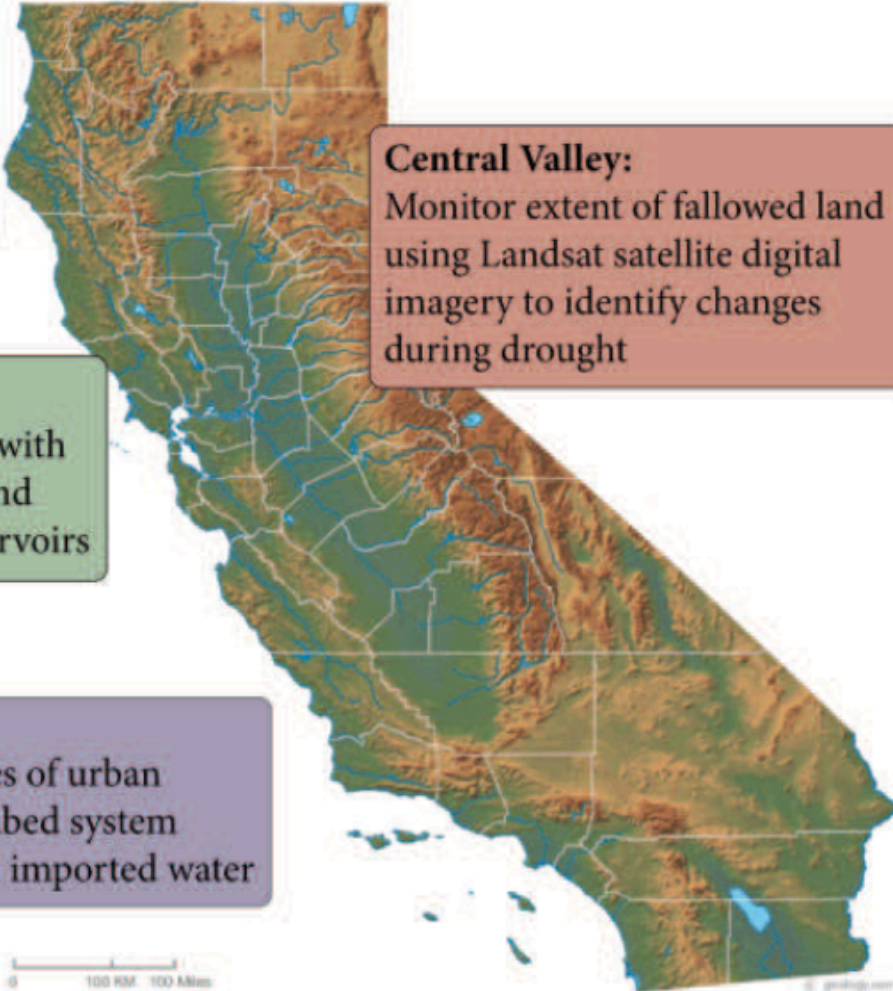
Focus on hydrologic extremes with droughts draining reservoirs and precipitation events filling reservoirs

## **Southern California:**

Address the complexities of urban droughts in a well-plumbed system that is heavily reliant on imported water

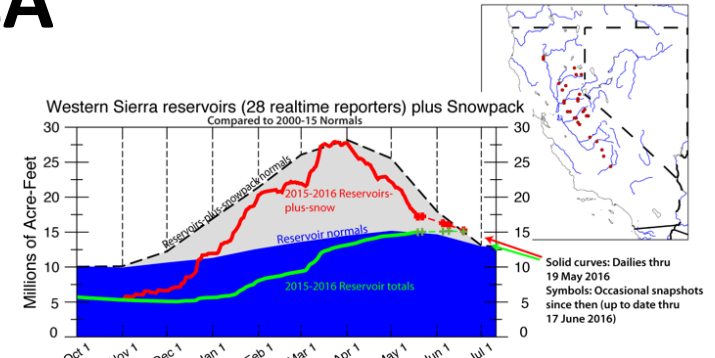
## **Central Valley:**

Monitor extent of fallowed land using Landsat satellite digital imagery to identify changes during drought

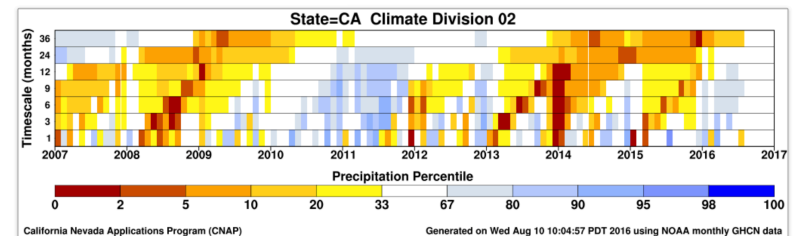
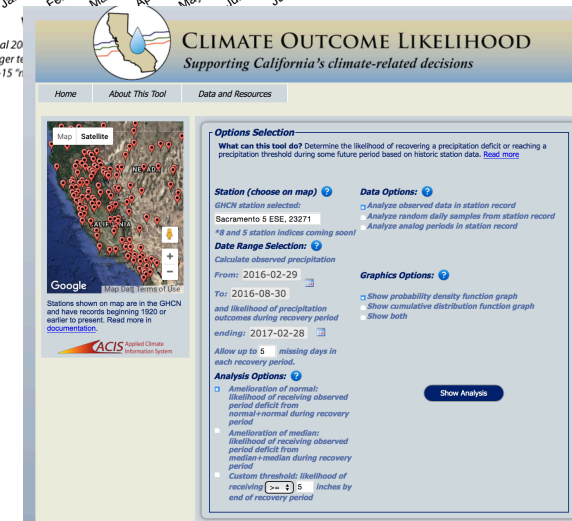


# Continue Development of Drought Early Warning in CA

- Climate Outcome Likelihood Tool
  - <http://wrcc.dri.edu/col/index/>
- Evaluating and understanding seasonal forecast skill using the National Multi-Model Ensemble (NMME)
- Development of a historical catalogue of atmospheric rivers
- Investigation of the impacts of drought & climate impacts on wildfire
- Evaluation of water supplies in California, including water stored in state's snowpack, reservoirs, and to the extent possible, groundwater storage
- Evaluation of historical atmospheric circulation patterns related to major precipitation events and lack thereof to aid forecasts of drought and drought busting
- Drought scenario planning with local agency planners and water utilities using downscaled climate model projections focused on California
- Near real time ground water pumping in the Central Valley with USGS

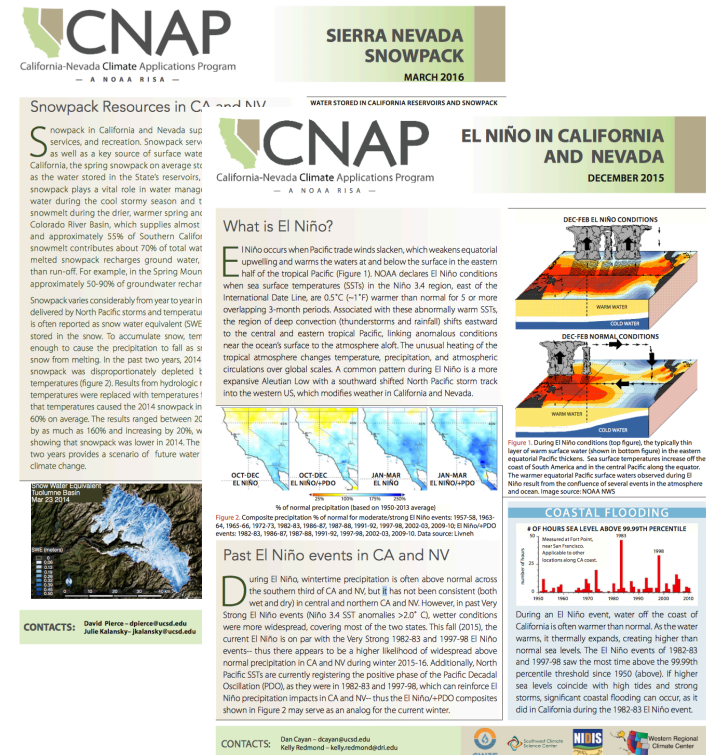


Caveat: The recent-normal 2015-2016 to be only 81% of the longer term getting back to the 2000-15 historical terms.



# Recent California DEWS Early Warning Activities

- Stakeholder and decision maker engagement through meetings, webinars, interviews, invited presentations, and other outreach activities at the state and regional scale.
- Timely two page informational handouts
- Southern California NIDIS Community Meeting, July 2015
- Winter Status Update Meeting (San Diego) and Webinar, January 2016



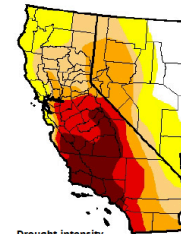


# 2016-2017 Activities

- Drought and Climate Outlook Webinar Series (Aug., Nov., Jan., March)
  - **Next webinar Nov 28<sup>th</sup> at 11am PT**
- Several In-person Drought and Climate Outlooks and Information Gathering Meetings
  - Southern California – Sept 15<sup>th</sup>, Riverside
  - North Central Coast – Oct 11<sup>th</sup>, Seaside
  - **Central Valley – Oct 12<sup>th</sup>, Fresno**
  - *Winter Status Update – Jan/Feb 2017, San Diego*
  - *CA/NV DEWS Kickoff Meeting - March 2017, TBD*
- More information:
   
<https://drought.gov/drought/dews/california-nevada>

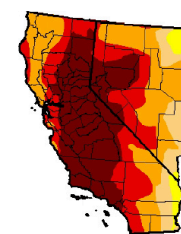


U.S. DROUGHT MONITOR  
FOR AUGUST 23, 2016



Drought intensity  
 D0: Abnormally dry  
 D1: Moderate drought  
 D2: Severe drought  
 D3: Extreme drought

U.S. DROUGHT MONITOR  
FOR AUGUST 25, 2015



<http://droughtmonitor.unl.edu/>

## CURRENT CONDITIONS

While drought conditions in some portions of the region like Northern California and northeast Nevada have improved since the same time last year, much of California and Nevada is still in the midst of a prolonged and record-breaking drought. The central coast and southern regions of California continue to experience high temperatures and dry conditions, which have further exacerbated the wildfire season.

Despite improved precipitation as compared to 2015, the region as a whole continues to experience a large precipitation deficit. June of 2016 brought pockets of much needed precipitation to the Great Basin and Northern California. This in addition to near average snowfall over the winter contributed to improved reservoir levels in Northern California with some reaching above or nearing average storage levels.

In 2015 California's 8 and 5 station indices were both at record low levels, but in 2016 the 8-station index was above and the 5-station was near average. A new 6-station index in the Tulare Basin recorded levels near, but still below average for 2016. While these increased accumulations do not make up for the accumulated precipitation deficit over the last four years of drought they are an important improvement because of the importance of precipitation in the Sierra Nevada on water resources for the state.

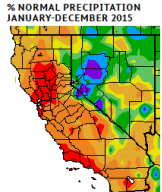
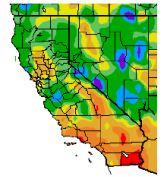
## CLIMATE OUTLOOK

As last year's El Niño continues to deteriorate and cooler than normal sea surface temperatures (SST) are observed in the tropical Pacific Ocean, the chances of a La Niña developing are 57%. While the odds of a La Niña developing are greater than normal (by approximately 60%), it is important to note that there is also a 38% chance of a neutral year (neither El Niño or La Niña) (27% higher than normal).

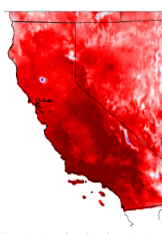
If a La Niña does develop it is expected to be a relatively weak event. Each La Niña is different, but on average they result in 15-20% drier than average conditions in Southern California, modestly drier conditions in Southern Nevada and wetter than average in Northern Nevada. There is not a consistent signal for Northern California where much of the states water resources originate. This means added uncertainty for seasonal forecasts for the region and the associated impacts on water resources for the state as a whole.

The effect of La Niña on winter precipitation is strongest in Southern California where drier than normal conditions tend to develop. If a typical La Niña does develop this region has been one of the slowest to recover from the current drought and a La Niña could

% NORMAL PRECIPITATION  
JANUARY-JULY 2016



THE MISSING YEARS:  
PRECIPITATION DEFICITS OVER  
FOUR WINTERS 2011-12/14-15



EXCESS  
+ 2 YEARS  
DEFICIT  
- 2 YEARS

Expressed in Units of Average Annual  
Precipitation. Based on PDSM. Courtesy Paul  
Iniguez, NWS Phoenix.

August 24<sup>th</sup> Webinar Summary



# Again....what is a Drought Early Warning System?

A DEWS utilizes **new and existing partner networks** to optimize the expertise of a wide range of federal, tribal, state, local and academic partners in order **to make climate and drought science and impact data readily available, easily understandable and usable for decision makers; and to improve the capacity of stakeholders and economic sectors to better monitor, forecast, plan for and cope with the impacts of drought at all spatial and time scales.**



# New opportunities with the newly expanded California-Nevada DEWS



# First two years of a DEWS

## Year 1

- Scoping the Drought Early Warning System

- Gap analyses
  - What information exists?
  - How is it used?
- Identify 2-3 critical issues
- Characterize and communicate risks across timescales



## Year 2

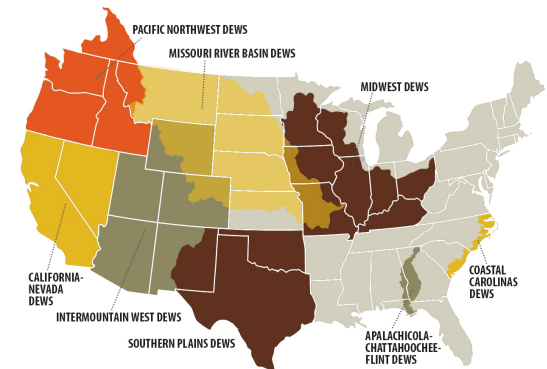
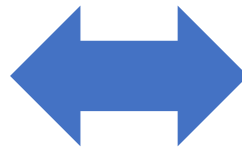
- Implementation of the DEWS

- Consider seasonal, multi-year, longer term trends
- Develop drought sub-portals
- Embed information into preparedness & adaptation plans
- Establish network for ongoing communication on impacts and projects



# Benefits of a DEWS Strategic Plan

- Fostering a regional network
- Collaboration and coordination
- Reference to help generate policy and governmental support
- Resource to assist with leveraging funds
- Foster sharing of activities and info within and across other DEWS



# Development of the CA-NV DEWS Strategic Plan

- Roadmap for moving forward with the CA-NV DEWS
- Identify existing and new drought- related activities throughout the region
- Living document w/ 2-yr time frame
- Focus is on activities in the region



# Questions?

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